

ABSTRACT

[0095] The present invention provides new compounds for use in proton exchange membranes which are able to operate in a wide variety of temperature ranges, including in the intermediate temperature range of about 100 °C to 700 °C, and new and improved methods of making these compounds. The present invention also provides new and improved methods for making chalcogenide compounds, including, but not limited to, non-protonated sulfide, selenide and telluride compounds. In one embodiment, the proton conductivity of the compounds is between about 10^{-8} S/cm and 10^{-1} S/cm within a temperature range of between about -50 and 500 °C.